IDENTIFICATION

PRODUCT CODE:	MAINDEC-8E-D0DB-D
PRODUCT NAME:	RANDOM AND TEST
DATE CREATED:	JUNE 7,1971
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	MICHAEL DAVIS

1. ABSTRACT

THIS PROGRAM TESTS THE AND INSTRUCTING OF THE PDP-8E, THE AND INSTRUCTION, INSTRUCTION ADDRESS, OPERAND ADDRESS AND BOTH OPERANDS ARE PRODUCED BY RANDOM NUMBER GENERATORS,

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-8E EQUIPPED WITH AT LEAST 4K OF MEMORY,

TELETYPE,

2.2 STORAGE

THE PROGRAM IS INITIALLY LOADED INTO LOCATIONS 0000 THRU 1177,
THE INITIAL TEST AREA IS 1200-7777, WHEN THE PROGRAM RELOCATES,
IT OCCUPIES 6600-7777, THE TEST AREA IS THEN 0000-6577,

2.3 PRELIMINARY PROGRAMS

MAINDEC-8E-D0AA, D0BA, D0CA

3. LOADING PROCEDURE

THE STANDARD PROCEDURE FOR LOADING BINARY TAPES IS TO BE USED,

4. STARTING PROCEDURE

4.1 STARTING ADDRESS

0200

4.2 CONTROL SWITCH SETTINGS

SR00=1, SUPPRESS HALT ON ERROR
SR01=1, HALT AT END OF PASS, RESTORE LOADERS
SR02=1, SUPPRESS PROGRAM RELOCATION
SR03=1, SUPPRESS END OF PASS TYPEOUT
SR09=1, HOLD DATA 1 CONSTANT
SR10=1, HOLD DATA 2 CONSTANT
SR11=1, HOLD INSTRUCTION CONSTANT

4.3 OPERATOR ACTION

4.3.1 SET SR TO 0200

4.3.2 PRESS LOAD ADDRESS SWITCH

4.3.3 SET SR TO 0000

4.3.4 PRESS CLEAR AND CONTINUE SWITCHES

5. OPERATING PROCEDURE

SAME AS 4.

6. ERRORS

6.1 RELOCATION ERROR

IF AN ERROR OCCURS DURING PROGRAM RELOCATION, THE PROGRAM WILL HALT AT 234 OR 6634, DEPENDING UPON WHETHER THE PROGRAM IS LOCATED LOW OR HIGH.

6.2 DATA ERRORS

IF THE LINK IS SET AFTER COMPLETION OF THE AND INSTRUCTION, OR IF THE RESULTS OF THE AND INSTRUCTION ARE INCORRECT, THE PROGRAM WILL HALT AT 731(7331) WITH DATA1 IN THE AC.

DEPRESS CONTINUE TO DISPLAY DATA2 IN THE AC.
DEPRESS CONTINUE TO DISPLAY AND INSTRUCTION IN AC.
DEPRESS CONTINUE TO DISPLAY INSTRUCTION ADDRESS IN AC.
DEPRESS CONTINUE TO DISPLAY DATA2 ADDRESS IN AC.
DEPRESS CONTINUE TO DISPLAY INDIRECT POINTER (USED BY INDIRECT AND) IN AC.
DEPRESS CONTINUE TO RESUME TEST

6.3 ERROR RECOVERY

6.3.1 RELOCATION ERROR

RELOAD PROGRAM

6.3.2 DATA ERROR

SEE 6.2

6.4 LOOPING

SET SR00=1 TO PREVENT HALT AFTER ERROR,

SET SR02=1 TO PREVENT RELOCATION,

SET SR03=1 TO SUPPRESS END OF PASS TYPEOUT,

SET SR09-SR11=1 TO HOLD INSTRUCTION AND DATA CONSTANT,

7. RESTRICTIONS

NONE

8. EXECUTION TIME

THE PROGRAM PERFORMS 4096 RANDOM TESTS IN APPROXIMATELY 2 SECONDS AND THEN RELOCATES. THE PROGRAM WILL TYPE "A" AFTER EACH 4096 RANDOM TESTS UNLESS SR03=1.

9. PROGRAM DESCRIPTION

THE PROGRAM IS INITIALLY LOADED INTO LOCATIONS 0200-1177, WITH TEMPORARY STORAGE LOCATIONS ON PAGE 0. AFTER INITIAL KEYSTART, THE PROGRAM WILL SAVE RIM AND BIN LOADERS IN PAGE 0 AND WILL THEN PROCEED TO USE LOCATIONS 1200-7777 AS A TEST AREA.

THE PROGRAM USES SEPARATE RANDOM NUMBER GENERATORS TO GENERATE THE AND INSTRUCTION, INSTRUCTION AND DATA ADDRESSES, AND THE TWO ARGUMENTS TO BE "ANDED". THE INSTRUCTIONS AND DATA ARE STORED IN THEIR PREVIOUSLY GENERATED ADDRESSES. THE PROGRAM TRANSFERS TO THE LOCATION OF THE INSTRUCTION AND EXECUTES IT. THE PROGRAM THEN TRANSFERS TO A COMPARISON ROUTINE WHERE THE ACTUAL RESULT OF THE AND INSTRUCTION IS COMPARED TO A SIMULATED AND.

AFTER 4096 TESTS, THE PROGRAM TYPES "A", RELOCATES, AND CONTINUES TESTING.

```
                        /
                        /RANDOM AND TEST
                        /COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                        /V 82 07552
                        /
                        /
                        /TEMPORARY TRANSFER LOCATIONS ON PAGE 0
                        /
        0000    *0
0000    0000    TTANDL, 0
0001    5001    INSTL,  JMP     .               /STORAGE FOR AND INSTRUCTION
0002    0002    INADDL, 2       /STORAGE FOR AND INSTRUCTION ADDRESS
0003    0003    DATADL, 3               /STORAGE FOR DATA ADDRESS
0004    0003    IFLAGL, 3               /STORAGE FOR INSTRUCTION INDIRECT FLAG
0005    0000    PADDL,  0               /STORAGE FOR DATA INDIRECT ADDRESS
0006    0000    LIML,   0
0007    0000    PAGL,   0

        0010    *10
0010    0000    PNTRL,  0

        6007            CAF=6007
        7501            MQA=7501
        7421            MQL=7421
        0266            CNTR1L=LOHIL
        0020    *20
0020    0000    TEMP3L, 0

                        /
                        /INITIALIZATION AND CONTROL ROUTINES
                        /
        0200    *200
0200    6007    STARTL, CAF
0201    1204            TAD     .+3             /SAVE RIM AND BIN IN PAGE 0
0202    3201    PNTR1L, DCA     .-1             /ONLY AT INITIAL KEYSTART
0203    4205    PNTR2L, JMS     SAVBNL          /201 BECOMES JMP SETLKL
0204    5274    TEMP1L, JMP     SETLKL          /FOR ALL FUTURE PASSES
                        /
                        /TRANSFER RIM AND BIN LOADERS TO PAGE 0
                        /
0205    0000    SAVBNL, 0
0206    1374            TAD     C7600L          /SET AC=-200, NUMBER OF
0207    3266            DCA     CNTR1L          /LOCATIONS TO BE TRANSFERRED
0210    1374            TAD     C7600L          /FIRST "FROM"
0211    3202            DCA     PNTR1L          /LOCATION=7600
0212    3203            DCA     PNTR2L          /FIRST "TO" LOCATION=0
0213    4225            JMS     RELOL           /PERFORM TRANSFER
0214    5605            JMP I   SAVBNL          /EXIT
```

```
                        /
0215  0000    RESBNL, 0
0216  1374            TAD     C7600L          /SET AC=-200, NUMBER OF
0217  3266            DCA     CNTR1L          /LOCATIONS TO BE TRANSFERRED
0220  3202            DCA     PNTR1L          /FIRST "FROM" ADDRESS=0
0221  1374            TAD     C7600L          /FIRST "TO"
0222  3203            DCA     PNTR2L          /ADDRESS=7600
0223  4225            JMS     RELOL           /PERFORM TRANSFER
0224  5615            JMP I   RESBNL          /EXIT
                        /
                        /DATA TRANSFER ROUTINE

                        /

0225  0000    RELOL,  0
0226  1602            TAD I   PNTR1L          /GET DATA
0227  3603            DCA I   PNTR2L          /TRANSFER
0230  1602            TAD I   PNTR1L          /GET DATA
0231  7041            CIA
0232  1603            TAD I   PNTR2L          /COMPARE
0233  7640            SZA CLA
0234  7402            HLT                     /TRANSFER ERROR
0235  2202            ISZ     PNTR1L          /NEXT "FROM" LOCATION
0236  7000            NOP
0237  2203            ISZ     PNTR2L          /NEXT "TO" LOCATION
0240  7000            NOP
0241  2266            ISZ     CNTR1L
0242  5226            JMP     RELOL+1
0243  5625            JMP I   RELOL
                        /
                        /TRANSFER PROGRAM TO UPPER MEMORY
                        /
0244  4215    REHL,   JMS     RESBNL          /TRANSFER RIM AND BIN LOADERS
0245  1373            TAD     C7000L          /SET AC=-1000, NUMBER OF
0246  3266            DCA     CNTR1L          /LOCATIONS TO BE TRANSFERRED
0247  1365            TAD     C200L           /FIRST "FROM"
0250  3202            DCA     PNTR1L          /ADDRESS=200
0251  1372            TAD     C6600L          /FIRST "TO"
0252  3203            DCA     PNTR2L          /ADDRESS=6600
0253  4225            JMS     RELOL           /PERFORM TRANSFER
0254  5772            JMP I   C6600L          /GO TO PROGRAM START
                        /
                        /TRANSFER PROGRAM TO LOWER MEMORY
                        /
0255  4205    RELL,   JMS     SAVBNL          /TRANSFER RIM AND BIN LOADERS
0256  1373            TAD     C7000L          /SET AC=-1000, NUMBER OF
0257  3266            DCA     CNTR1L          /LOCATIONS TO BE TRANSFERED
0260  1372            TAD     C6600L          /FIRST "FROM"
0261  3202            DCA     PNTR1L          /ADDRESS=6600
0262  1365            TAD     C200L           /FIRST "TO"
0263  3203            DCA     PNTR2L          /ADDRESS=200

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0264  4225            JMS     RELOL           /PERFORM TRANSFER
0265  5765            JMP I   C200L           /GO TO PROGRAM START

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```

```
                        /
                        /DETERMINE IF PROGRAM IS IN LOWER OR UPPER MEMORY
                        /
0266  0000    LOHIL,    0                       /PC
0267  7330              CLA CLL CML RAR         /SET AC=4000
0270  1266              TAD     .-2             /ADD PC
0271  7630              SZL CLA                 /IS LINK=0
0272  1371              TAD     C6400L          /NO, HIGH CORE
0273  5666              JMP I   LOHIL           /RETURN
                        /
                        /TRANSFER TO LINKAGE GENERATION
                        /
0274  7300    SETLKL,   CLA CLL
0275  3202              DCA     PNTR1L          /CLEAR PASS COUNTER
0276  4266              JMS     LOHIL           /DETERMINE IF PROGRAM IS HIGH OR LOW
0277  5377              JMP     GOSETL          /GO TO TEST WITH ADDRESS MODIFIER IN AC
                        /
                        /SIMULATE LOGICAL AND WITH A AND B=NOT((NOTA)OR(NOTB))
                        /
0300  0000    SANDL,    0
0301  7040              CMA                     /NOTA
0302  3204              DCA     TEMP1L          /SAVE NOTA
0303  7501              MQA                     /GET B
0304  7040              CMA                     /NOTB
0305  7421              MQL                     /SAVE NOTB
0306  1204              TAD     TEMP1L          /GET NOTA
0307  7501              MQA                     /OR WITH NOTB
0310  7040              CMA                     /COMPLEMENT
0311  5700              JMP I   SANDL           /EXIT WITH RESULT IN AC
                        /
                        /TEST SWITCHES
                        /
0312  0000    SWITCL,   0
0313  7421              MQL                     /SAVE TEST BIT
0314  7604              LAS                     /GET SWITCHES
0315  4300              JMS     SANDL           /AND SWITCHES WITH TEST BIT
0316  7650              SNA CLA                 /IS SWITCH 0
0317  2312              ISZ     SWITCL          /NO SKIP INSTRUCTION AFTER RETURN
0320  5712              JMP I   SWITCL

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                        /
                        /END OF PASS
                        /
0321  0000    EPASL,    0
0322  2202              ISZ     PNTR1L          /END OF PASS ?
0323  5721              JMP I   EPASL           /NO, RETURN
0324  7332              CLA CLL CML RTR
0325  7012              RTR                     /SET AC=400
0326  4312              JMS     SWITCL          /TEST SR03
0327  5336              JMP     .+7             /SUPPRESS END OF PASS TYPEOUT
0330  1366              TAD     C215L
0331  4337              JMS     TYPEL           /TYPE CARRIAGE RETURN
0332  1367              TAD     C212L
0333  4337              JMS     TYPEL           /TYPE LINEFEED
0334  1370              TAD     A
0335  4337              JMS     TYPEL           /TYPE
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0336  5345            JMP     HALTL           /TEST FOR HALT, RELOCATION
                      /
                      /OUTPUT CHARACTER
                      /
0337  0000  TYPEL,    0
0340  6046            TLS
0341  6041            TSF
0342  5341            JMP     .-1
0343  7200            CLA
0344  5737            JMP I   TYPEL

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                      /
                      /CHECK FOR HALT
                      /
0345  7332  HALTL,    CLA CLL CML RTR         /SET AC=2000
0346  4312            JMS     SWITCL          /TEST SR01
0347  7410            SKP                     /SR01=1, HALT
0350  5355            JMP     RRELL           /CHECK FOR RELOCATION
0351  4266            JMS     LOHIL           /DETERMINE IF PROGRAM IS HIGH OR LOW
0352  7650            SNA CLA                 /AC=0, PROGRAM LOW
0353  4215            JMS     RESBNL          /PROGRAM LOW, RESTORE LOADERS
0354  7402            HLT
                      /
                      /CHECK FOR RELOCATION
                      /
0355  7332  RRELL,    CLA CLL CML RTR
0356  7010            RAR                     /SET AC=1000
0357  4312            JMS     SWITCL          /TEST SR02
0360  5721            JMP I   EPASL           /SR02=1,DO NOT RELOCATE PROGRAM
0361  4266            JMS     LOHIL           /DETERMINE IF PROGRAM IS HIGH OR LOW
0362  7650            SNA CLA                 /AC=0, PROGRAM LOW
0363  5244            JMP     REHL            /PROGRAM LOW, RELOCATE TO HIGH CORE
0364  5255            JMP     RELL            /PROGRAM HIGH, RELOCATE TO LOW CORE
0365  0200  C200L,    200
0366  0215  C215L,    215
0367  0212  C212L,    212
0370  0301  A,        301
0371  6400  C6400L,   6400
0372  6600  C6600L,   6600
0373  7000  C7000L,   7000
0374  7600  C7600L,   7600
                      /
      0377            *377
0377  7000  GOSETL,   NOP

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                      /
                      /SET UP ADDRESS POINTERS AND CONSTANTS AND TRANSFER TO NEXT PAGE
                      /
      0400            *400
0400  3237  SETAL,    DCA     TEMPL           /SAVE ADDRESS MODIFIER
0401  1242            TAD     LISTL           /GET POINTER FOR TRANSFER
0402  1237            TAD     TEMPL           /MODIFY FOR LOW OR HIGH CORE
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0403  3010            DCA     PNTRL           /SET UP AUTO-INDEX REGISTER
0404  1243            TAD     LGENL           /GET POINTER TO INSTRUCTION GENERATION
0405  1237            TAD     TEMPL           /MODIFY FOR LOW OR HIGH CORE
0406  3410            DCA I   PNTRL           /TRANSFER TO NEXT PAGE
0407  1245            TAD     LSANDL          /GET POINTER TO AND SIMULATER
0410  1237            TAD     TEMPL           /MODIFY FOR LOW OR HIGH CORE
0411  3410            DCA I   PNTRL           /TRANSFER TO NEXT PAGE
0412  1246            TAD     LRETUL          /GET POINTER FOR EXECUTION RETURN
0413  1237            TAD     TEMPL           /MODIFY FOR LOW OR HIGH CORE
0414  3410            DCA I   PNTRL           /TRANSFER TO NEXT PAGE
0415  1247            TAD     LSWITL          /GET POINTER TO SWITCH SENSING
0416  1237            TAD     TEMPL           /MODIFY FOR LOW OR HIGH CORE
0417  3410            DCA I   PNTRL           /TRANSFER TO NEXT PAGE
0420  1244            TAD     LEPASL          /GET POINTER TO END OF PASS
0421  1237            TAD     TEMPL           /MODIFY FOR LOW OR HIGH CORE
0422  3410            DCA I   PNTRL           /TRANSFER TO NEXT PAGE
0423  1237            TAD     TEMPL           /GET ADDRESS MODIFIER
0424  7640            SZA CLA                 /IS TEST IN LOW CORE
0425  5233            JMP     LHICOL          /NO,SET UP FOR HIGH CORE
0426  1240            TAD     L200L           /SET PAGE 0 EXCLUSION BIT
0427  3410            DCA I   PNTRL           /TRANSFER TO NEXT PAGE
0430  1250            TAD     L6600L          /GET LOW CORE ADDRESS LIMIT
0431  3410            DCA I   PNTRL           /TRANSFER TO NEXT PAGE
0432  5377            JMP     GOTSTL          /GO TO TEST
0433  3410  LHICOL,  DCA I   PNTRL           /CLERA PAGE 0 EXCLUSION BIT
0434  1251            TAD     L1201L          /GET HIGH CORE ADDRESS LIMIT
0435  3410            DCA I   PNTRL           /TRANSFER TO NEXT PAGE
0436  5377            JMP     GOTSTL          /GO TO TEST

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                        /
0437  0000  TEMPL,  0
0440  0200  L200L,  200
0441  7000  L7000L, 7000
0442  0753  LISTL,  TGENL-1
0443  1000  LGENL,  GENL
0444  0321  LEPASL, EPASL
0445  0300  LSANDL, SANDL
0446  0712  LRETUL, TRETUL
0447  0312  LSWITL, SWITCL
0450  6600  L6600L, 6600
0451  1201  L1201L, 1201
      0577  *577
0577  7000  GOTSTL, NOP

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                        /
                        /GENERATE TEST INSTRUCTION AND DATA
                        /
      0600  *600
0600  7300  TEST1L, CLA CLL
0601  1355            TAD     TANDL           /GET POINTER TO SIMULATED AND
0602  3000            DCA     TTANDL          /PLACE IN TRANSFER LOCATION
0603  7001            IAC                     /SET
0604  4757            JMS I   TSWITL          /TEST   1
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0605  5224            JMP     TDAT1L          /SR  ), DO NOT GENERATE INSTRUCTION
0606  1362            TAD     TLIML           /NO  )T ADDRESS LIMIT
0607  3026            DCA     LIML            /SAVE
0610  1361            TAD     TPAGBL          /GET PAGE EXCLUSION BIT
0611  3027            DCA     PAGL
0612  4754            JMS I   TGENL           /GENERATE INSTRUCTION
0613  3365            DCA     TIFLGL          /SAVE INDIRECT FLA
0614  1021            TAD     INSTL           /GET INSTRUCTION
0615  3363            DCA     TINSTL          /SAVE IT
0616  1022            TAD     INADDL          /GET INSTRUCTION ADDRESS
0617  3364            DCA     TINADL          /SAVE IT
0620  1023            TAD     DATADL          /GET DATA ADDRESS
0621  3366            DCA     TDATAL          /SAVE IT
0622  1025            TAD     PADDL           /GET INDIRECT TO DATA
0623  3367            DCA     TPADDL          /SAVE IT
0624  7105  TDAT1L,   CLL IAC RAL             /SET AC=2
0625  4757            JMS I   TSWITL          /TEST SR10
0626  5234            JMP     TDAT2L          /SR10=1, DO NOT GENERATE DATA1
0627  1370            TAD     TDA1L           /GENERATE RANDOM NUMBER
0630  7104            CLL RAL
0631  7430            SZL
0632  1374            TAD     T3L
0633  3370            DCA     TDA1L
0634  7307  TDAT2L,   CLA CLL IAC RTL         /SET AC=4
0635  4757            JMS I   TSWITL          /TEST SR09
0636  5244            JMP     SETTL           /SR09=1, DO NOT GENERATE DATA2
0637  1371            TAD     TDA2L           /GENERATE RANDOM NUMBER
0640  7104            CLL RAL
0641  7430            SZL
0642  1374            TAD     T3L
0643  3371            DCA     TDA2L

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                /
                /SET UP INSTRUCTION AND DATA AT TEST ADDRESS
                /ALONG WITH RETURN TO THIS ROUTINE
                /
0644  7300  SETTL,   CLA CLL
0645  1363            TAD     TINSTL          /GET INSTRUCTION
0646  3764            DCA I   TINADL          /STORE IN TEST LOCATION
0647  1365            TAD     TIFLGL          /GET INDIRECT FLAG
0650  7650            SNA CLA                 /IS INSTRUCTION INDIRECT
0651  5267            JMP     DIRL            /NO, GET DATA
0652  1366            TAD     TDATAL          /INDIRECT, IS ADDRESS
0653  1375            TAD     T7760           /AUTO-INDEX REGISTER
0654  7630            SZL CLA
0655  5262            JMP     .+5             /NO, USE POINTER AS IS
0656  1366            TAD     TDATAL
0657  1376            TAD     T7770
0660  7630            SZL CLA
0661  7040            CMA                     /ADDRESS IS AUTO-INDEX REGISTER
0662  1367            TAD     TPADDL          /GET INDIRECT ADDRESS
0663  3766            DCA I   TDATAL          /STORE IN TEST LOCATION
0664  1370            TAD     TDA1L           /GET DATA
0665  3767            DCA I   TPADDL          /STORE IN TEST LOCATION
0666  5271            JMP     DOTSTL
0667  1370  DIRL,     TAD     TDA1L           /GET DATA
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0670  3766            DCA I   TDATAL          /STORE IN TEST LOCATION
                      /
                      /SIMULATE "AND"
                      /

0671  7300    DOTSTL, CLA CLL
0672  1370            TAD     TDA1L           /GET DATA1
0673  7421            MQL                     /SAVE IN MQ
0674  1371            TAD     TDA2L           /GET DATA2
0675  4755            JMS I   TANDL           /DO SIMULATION
0676  3372            DCA     TSIML           /SAVE ANSWER
                      /
                      /GO TO TEST
                      /
0677  1356    DOANDL, TAD     TRETTL          /GET RETURN ADDRESS
0700  3000            DCA     TTANDL          /SAVE
0701  1364            TAD     TINADL          /GET INSTRUCTION ADDRESS
0702  7001            IAC                     /INCREMENT
0703  7450            SNA                     /IS IT 0
0704  5200            JMP     TEST1L          /YES, GENERATE NEW INFORMATION
0705  3353            DCA     TEMP2L          /NO, SAVE
0706  1373            TAD     T5400L          /GET RETURN INSTRUCTION
0707  3753            DCA I   TEMP2L          /PUT IN TEST LOCATION
0710  1371            TAD     TDA2L           /GET DATA2
0711  5764            JMP I   TINADL          /EXECUTE "AND"

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                      /
                      /RETURN HERE AFTER EXECUTION
                      /
0712  3377    TRETUL, DCA     TRACL           /SAVE AC
0713  7430            SZL                     /IS LINK=1
0714  4324            JMS     ERROR           /LINK=1, ERROR
0715  1372            TAD     TSIML           /GET SIMULATION RESULT
0716  7041            CIA
0717  1377            TAD     TRACL           /ADD REAL RESULT
0720  7640            SZA CLA                 /ARE THEY THE SAME
0721  4324            JMS     ERROR           /NO, ERROR
0722  4760            JMS I   TEPASL          /END OF PASS
0723  5200            JMP     TEST1L
                      /
                      /ERROR HANDLER
                      /
0724  0000    ERROR,  0
0725  7330            CLA CLL CML RAR         /SET AC=4000
0726  4757            JMS I   TSWITL          /TEST SR00
0727  5351            JMP     TEXITL          /SR00=1, DO NOT HALT ON ERROR
0730  1370            TAD     TDA1L           /DISPLAY DATA1 IN AC
0731  7402            HLT
0732  7200            CLA
0733  1371            TAD     TDA2L           /DISPLAY DATA2 IN AC
0734  7402            HLT
0735  7200            CLA
0736  1001            TAD     INSTL           /DISPLAY INSTRUCTION IN AC
0737  7402            HLT
0740  7200            CLA
0741  1364            TAD     TINADL          /DISPL )INSTRUCTION ADDRESS IN AC
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0742  7402            HLT
0743  7200            CLA
0744  1366            TAD     TDATAL          /DISPLAY DATA ADDRESS IN AC
0745  7402            HLT
0746  7200            CLA
0747  1367            TAD     TPADDL          /DSIPLAY INDIRECT IN AC
0750  7402            HLT
0751  7300    TEXITL, CLA CLL
0752  5724    JMP I   ERROR
                      /
                      /
                      /
0753  0000    TEMP2L, 0
0754  0000    TGENL,  0
0755  0000    TANDL,  0
0756  0000    TRETTL, 0
0757  0000    TSWITL, 0
0760  0000    TEPASL, 0
0761  0000    TPAGBL, 0
0762  0000    TLIML,  0
0763  0000    TINSTL, 0
0764  0000    TINADL, 0
0765  0000    TIFLGL, 0

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0766  0000    TDATAL, 0
0767  0000    TPADDL, 0
0770  0021    TDA1L,  21
0771  0037    TDA2L,  37
0772  0000    TSIML,  0
0773  5400    T5400L, 5400
0774  0003    T3L,    3
0775  7760    T7760,  7760
0776  7770    T7770,  7770
0777  0000    TRACL,  0

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                      /
                      /GENERATE INSTRUCTIONS AND ADDRESSES
                      /
      1000    *1000
1000  0000    GENL,   0
                      /
                      /GENERATE "AND" INSTRUCTION
                      /
1001  1367    GANDL,  TAD     R1L
1002  4340            JMS     RANDL           /GENERATE RANDOM NUMBER
1003  3367            DCA     R1L             /SAVE NUMBER
1004  1367            TAD     R1L
1005  7421            MQL
1006  1007            TAD     PAGL
1007  7501            MQA                     /OR RANDOM NUMBER WITH EXCLUSION BIT
1010  7421            MQL
1011  1371            TAD     K0777           /MASK OFF 3MSB
1012  4400            JMS I   TTANDL          /TO GET "0" OP CODE
1013  3001            DCA     INSTL           /SAVE INSTRUCTION
1014  1001            TAD     INSTL           /GET INSTRUCTION
```

```
1015  4354            JMS     AND17L          /EXTRACT PAGE ADDRESS OF INSTRUCTION
1016  3020            DCA     TEMP3L          /SAVE PAGE ADDRESS OF INSTRUCTION
                      /
                      /GENERATE ADDRESS FOR INSTRUCTION
                      /
1017  1372  GANADL,   TAD     R2L
1020  4340            JMS     RANDL           /GENERATE RANDOM NUMBER
1021  3372            DCA     R2L             /SAVE NUMBER
1022  4345            JMS     CLIML           /SET UP TO TEST ADDRESS LIMITS
1023  1372            TAD     R2L
1024  7620            SNL CLA                 /IS ADDRESS WITHIN LIMITS
1025  5217            JMP     GANADL          /NO, GENERATE NEW ADDRESS
1026  1372            TAD     R2L
1027  1373            TAD     P0L
1030  7620            SNL CLA                 /IS ADDRESS ON PAGE 0
1031  5246            JMP     PAGADL          /NO
1032  1020            TAD     TEMP3L          /GET PAGE ADDRESS OF INSTRUCTION
1033  7041            CIA
1034  1372            TAD     R2L             /SUBTRACT ADDRESS
1035  4361  PAGAL,    JMS     ABSL
1036  7700            SMA CLA                 /IS DIFFERENCE >2
1037  5217            JMP     GANADL          /NO
1040  1020  PAL,      TAD     TEMP3L          /GET PAGE ADDRESS OF INSTRUCTION
1041  7650            SNA CLA                 /DOES INSTRUCTION REFERENCE LOCATION 0
1042  5201            JMP     GANDL           /YES, GENERATE NEW INSTRUCTION
1043  1372            TAD     R2L             /YES, USE ADDRESS
1044  3002            DCA     INADDL
1045  5261            JMP     DAADL           /GENERATE ADDRESS FOR DATA
1046  1001  PAGADL,   TAD     INSTL           /GET INSTRUCTION
1047  7421            MQL
1050  1376            TAD     K200L
1051  4400            JMS I   TTANDL          /MASK CURRENT PAGE BIT
1052  7650            SNA CLA                 /IS PAGE BIT SET
1053  5240            JMP     PAL             /NO, USE ADDRESS AS IS

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1054  1372            TAD     R2L
1055  4354            JMS     AND17L
1056  7041            CIA
1057  1020            TAD     TEMP3L
1060  5235            JMP     PAGAL

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                      /
                      /GENERATE ADDRESS FOR DATA
                      /

1061  1001  DAADL,    TAD     INSTL           /GET INSTRUCTION
1062  7421            MQL
1063  1376            TAD     K200L
1064  4400            JMS I   TTANDL          /DOES INSTRUCTION REFERENCE PAGE 0
1065  7650            SNA CLA
1066  5306            JMP     P0AL            /YES
1067  1002            TAD     INADDL
1070  7421            MQL
1071  1373            TAD     P0L
```

```
1072  4400            JMS I   TTANDL          /EXIT IF PAGE OF ADDRESS
1073  7421            MQL
1074  1020            TAD     TEMP3L
1075  7501            MQA                     /"OR" TOGETHER TO GET
1076  3003            DCA     DATADL          /DATA ADDRESS
1077  1001  INDIRL,     TAD     INSTL
1100  7421            MQL
1101  1375            TAD     K400L
1102  4400            JMS I   TTANDL
1103  7640            SZA CLA                 /IS INSTRUCTION INDIRECT
1104  5311            JMP     PADL            /YES, INSTRUCTION IS INDIRECT
1105  5600            JMP I   GENL            /EXIT
1106  1020  P0AL,     TAD     TEMP3L
1107  3003            DCA     DATADL
1110  5277            JMP     INDIRL
                      /
                      /GENERATE INDIRECT ADDRESS FOR DATA
                      /
1111  1377  PADL,     TAD     R3L             /GENERATE RANDOM NUMBER
1112  4340            JMS     RANDL
1113  3377            DCA     R3L
1114  4345            JMS     CLIML
1115  1377            TAD     R3L
1116  7620            SNL CLA                 /IS ADDRESS WITHIN LIMITS
1117  5311            JMP     PADL            /NO, TRY AGAIN
1120  1002            TAD     INADDL          /GET INSTRUCTION ADDRESS
1121  7041            CIA
1122  1377            TAD     R3L             /SUBSTRACT INDIRECT
1123  4361            JMS     ABSL            /GENERATE -ABSOLUTE VALUE
1124  7700            SMA CLA                 /DO INSTRUCTION AND ADDRESS INTERFERE
1125  5311            JMP     PADL            /YES
1126  1003            TAD     DATADL
1127  7041            CIA
1130  1377            TAD     R3L
1131  4361            JMS     ABSL
1132  7700            SMA CLA
1133  5311            JMP     PADL
1134  1377            TAD     R3L             /NO
1135  3005            DCA     PADDL
1136  7040            CMA

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1137  5600            JMP I   GENL            /EXIT

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1140  0000  RANDL,    0
1141  7104            CLL RAL
1142  7430            SZL
1143  1370            TAD     K3L
1144  5740            JMP I   RANDL
                      /
                      /
                      /
1145  0000  CLIML,    0
1146  1007            TAD     PAGL
1147  7100            CLL
```

```
1150  7650    SNA CLA
1151  7020            CML
1152  1006            TAD     LIML
1153  5745            JMP I   CLIML
                      /
                      /
                      /
1154  0000    AND17L, 0
1155  7421            MQL
1156  1374            TAD     K0177L
1157  4400            JMS I   TTANDL
1160  5754            JMP I   AND17L
                      /
                      /
                      /
1161  0000    ABSL,   0
1162  7500            SMA
1163  7041            CIA
1164  7001            IAC
1165  7001            IAC
1166  5761            JMP I   ABSL
                      /
                      /
                      /
1167  0001    R1L,    1
1170  0003    K3L,    3
1171  0777    K0777,  777
1172  0005    R2L,    5
1173  7600    P0L,    7600
1174  0177    K0177L, 177
1175  0400    K400L,  400
1176  0200    K200L,  200
1177  0015    R3L,    15

                      $
```



```
0000  11111111  10000000  10000000  00000000  00000000  00000000  00000000  00000000
0100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111001

0400  11111111  11111111  11111111  11111111  11111111  11000000  00000000  00000000
0500  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000001

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1200
1300
```

```
1400
1500

1600
1700


2000
2100

2200
2300

2400
2500

2600
2700


3000
3100

3200
3300

3400
3500

3600
3700
```



```
4000
4100

4200
4300

4400
4500

4600
4700


5000
5100

5200
5300

5400
5500

5600
5700
```

```
6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300

7400
7500

7600
7700
```


A	0370	PADDL	0005	TSIML	0772
ABSL	1161	PADL	1111	TSWITL	0757
AND17L	1154	PAGADL	1046	TTANDL	0000
C200L	0365	PAGAL	1035	TYPEL	0337
C212L	0367	PAGL	0007		
C215L	0366	PAL	1040		
C6400L	0371	PNTR1L	0202		
C6600L	0372	PNTR2L	0203		
C7000L	0373	PNTRL	0010		
C7600L	0374	R1L	1167		
CAF	6007	R2L	1172		
CLIML	1145	R3L	1177		
CNTR1L	0266	RANDL	1140		
DAADL	1061	REHL	0244		
DATADL	0003	RELL	0255		
DIRL	0667	RELOL	0225		
DOANDL	0677	RESBNL	0215		
DOTSTL	0671	RRELL	0355		
EPASL	0521	SANDL	0300		
ERROR	0724	SAVBNL	0205		
GANADL	1017	SETAL	0400		
GANDL	1001	SETLKL	0274		
GENL	1000	SETTL	0644		
GOSETL	0377	STARTL	0200		
GOTSTL	0577	SWITCL	0312		
HALTL	0345	T3L	0774		
IFLAGL	0004	T5400L	0773		
INADDL	0002	T7760	0775		
INDIRL	1077	T7770	0776		
INSTL	0001	TANDL	0755		
)77L	1174	TDA1L	0770		
)77	1171	TDA2L	0771		

```
K7          1176                TDAT1L  0624
K[          1170                TDAT2L  0634
K400L       1175                TDATAL  0766
L1201L      0451                TEMP1L  0204
L200L       0440                TEMP2L  0753
L6600L      0450                TEMP3L  0020
L7000L      0441                TEMPL   0437
LEPASL      0444                TEPASL  0760
LGENL       0443                TEST1L  0600
LHICOL      0433                TEXITL  0751
LIML        0006                TGENL   0754
LISTL       0442                TIFLGL  0765
LOHIL       0266                TINADL  0764
LRETUL      0446                TINSTL  0763
LSANDL      0445                TLIML   0762
LSWITL      0447                TPADDL  0767
MQA         7501                TPAGBL  0761
MQL         7421                TRACL   0777
P0AL        1106                TRETTL  0756
P0L         1173                TRETUL  0712

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ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME:  5 SECONDS

2K CORE USED
```